

AMENDMENTS TO THE DRAWINGS:

The attached sheet of drawings include changes to Figures 6(a), 6(b), and 6(c). These sheets replace the original sheets including Figures 6(a), 6(b), and 6(c), labeling these figures as prior art.

Attachment: Replacement Sheets

REMARKS

The application has been amended in a manner to place this application in condition for allowance the time of the next Official Action.

The specification has been amended to change Table 2 consistent with the disclosure on Page 12, lines 21-24 of the application as filed.

Replacement drawings are submitted for Figures 6(a), 6(b), and 6(c), labeling these figures as prior art. This change to the drawings is the only change, and is not new matter.

Claims 1-12 are pending in the application.

Claims 1-12 are rejected as unpatentable over Abe patent No. 6,767,826 in view of Ueno patent No. 6,245,676. This rejection is respectfully traversed.

Claim 1 is amended and provides that the electroplating method includes a current step for flowing a current in the direction opposite to the direction for growing the plating so as to cancel a concentration gradient of a brightener which accelerates the growth of plating.

The position set forth in the Official Action is that Abe teaches a electroplating method that includes flowing a current in the direction opposite to the direction for growing the plating at column 5, lines 54-64, and that Ueno teaches three current steps at column 8, lines 18-25. The conclusion set forth in the Official Action is that it would be obvious to combine the

references to produce a high copper ratio area as described in column 3, lines 54-57, of Ueno. However, the conclusion set forth in the Official Action is believed untenable for at least the following reasons.

First, Abe does not teach that for which it is offered. Specifically, column 5, lines 54-64, of Abe disclose forming a Cu-plated film 15 by an electroplating method. The Cu-plated film 15 is deposited until the via hole 11 and the trenches of the dummy patterns 12 are perfectly buried thereby. The Cu-plated film 15 is bottom-up grown. However, neither column 5, lines 54-64, of Abe nor any other passage of Abe discloses a direction of flow of a current to obtain the bottom-up growth. Accordingly, Abe could not teach flowing a current in the direction opposite to the direction for growing the plating as suggested.

Second, neither Abe nor Ueno disclose a brightener. A brightener as disclosed on page 2, lines 11-13, of the present application is used to obtain very fine patterns free of voids. The only additive disclosed by either of the references is a suppressor as disclosed on column 3, lines 1-3, of Ueno that teaches a suppressor that prevents copper from adhering to portions of the seed layer or the copper plated layer. Neither Abe nor Ueno disclose a brightener which accelerates the growth of plating as recited. Therefore, the proposed combination of

references could not teach a current step for canceling a concentration gradient of a brightener as recited.

Third, the purpose of the negative DC current in Ueno is opposite to that of the present application. Ueno at column 9, lines 20-24, disclose that negative DC current is conducted in order to deposit the copper plated layer. As disclosed on column 9, lines 55-61, of Ueno in conjunction with Figure 2(a), the copper plated layer 37b is more protruded in the trenches than in other areas so that during the CMP process, erosion does not occur in the trenches. Ueno does not prevent the growth of the copper layer to reduce protrusions by following a current in the direction opposite to the direction for growing the plating layer so as to cancel the concentration gradient of a brightener which accelerates the growth of plating as recited.

The above noted features are missing from each of the references, are absent from the combination, and thus are not obvious to one of the ordinary skill in the art.

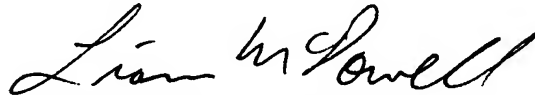
Claims 2-12 depend from claim 1 and further define the invention and are also believed patentable over the cited prior art.

In view of the present Amendment and the foregoing remarks, it is believed that the present application has been placed in condition for allowance. Reconsideration and allowance are respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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Docket No. 8001-1191
Appln. No. 10/777,198

APPENDIX:

The Appendix includes the following item(s):

- ☐ - a terminal disclaimer
- ☐ - a 37 CFR 1.132 Declaration
- ☐ - a new or amended Abstract of the Disclosure
- ☒ - a Replacement Sheet for Figures 6(a), 6(b), and 6(c) of the drawings
- ☐ - a Substitute Specification and a marked-up copy of the originally-filed specification
- ☐ - a verified English translation of foreign priority document